

Intensive Lecture (English)

<Surface characterizations for catalysts and related topics>

Lecturers

Prof. Maria Olea

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Prof. Kiyotaka Asakura

(Professor, Institute for Catalysis, Hokkaido University, Japan)

Aim of the lecture

Catalysts are important materials to convert the materials in high efficiency, to create the energy and to improve the environments. Many catalytic reactions take place on the surface of solids. Two lecturers give you a talk from both fundamental approach to catalyst and its applications to industry. We are going to give a series of lectures on the modern surface characterization techniques to determine the electronic states and surface structures and on the role of catalysts, their synthesis, scale-up and industrial applications. The students are expected to learn the fundamental ideas about catalytic reactions, characterizations of heterogeneous catalysts and scale-up for industrialization. They will know the principles of catalyst science and technology.

Lecture Place FCC building, 1 F Seminar Room 1

Lecture Plan

Monday, 16 December

8:45-10:15 (by Prof. Olea)

1. Catalysts and catalytic processes and their driving forces;

10:30-12:00 (by Prof. Asakura)

2. Surface science and catalysis

13:00-14:30 (by Prof. Olea)

3. Synthesis of supported catalysts on mesoporous silica, namely SBA-15 and MCM-41, by sol-gel method

Tuesday, 17 December

13:00-14:30 (by Prof. Olea): Opened Seminar

4. "Catalysts scale up from gram to kilogram; catalytic reactors and microreactors (reactors scale-down)"

14:45-16:15 (by Prof. Asakura)

5. EXAFS spectroscopy to characterize the surface structure

16:30-18:00 (by Prof. Asakura)

6. STM and AFM application to crystal surface

Wednesday, 18 December

8:45-10:15 (by Prof. Olea)

7. Industrial applications, namely hydrogen (the fuel of the future) production and storage.

Tuesday, 24 December

10:30-12:00 (Students)

8. Presentations

Evaluation

The students will be evaluated based on the final presentations.

(KEYWORDS) Catalysts and catalytic processes, Surface characterization, XAFS, STM and AFM, Synthesis of supported catalysts, SBA-15, MCM-41, mesoporous, Scale up, catalytic reactors, microreactors, scale-down